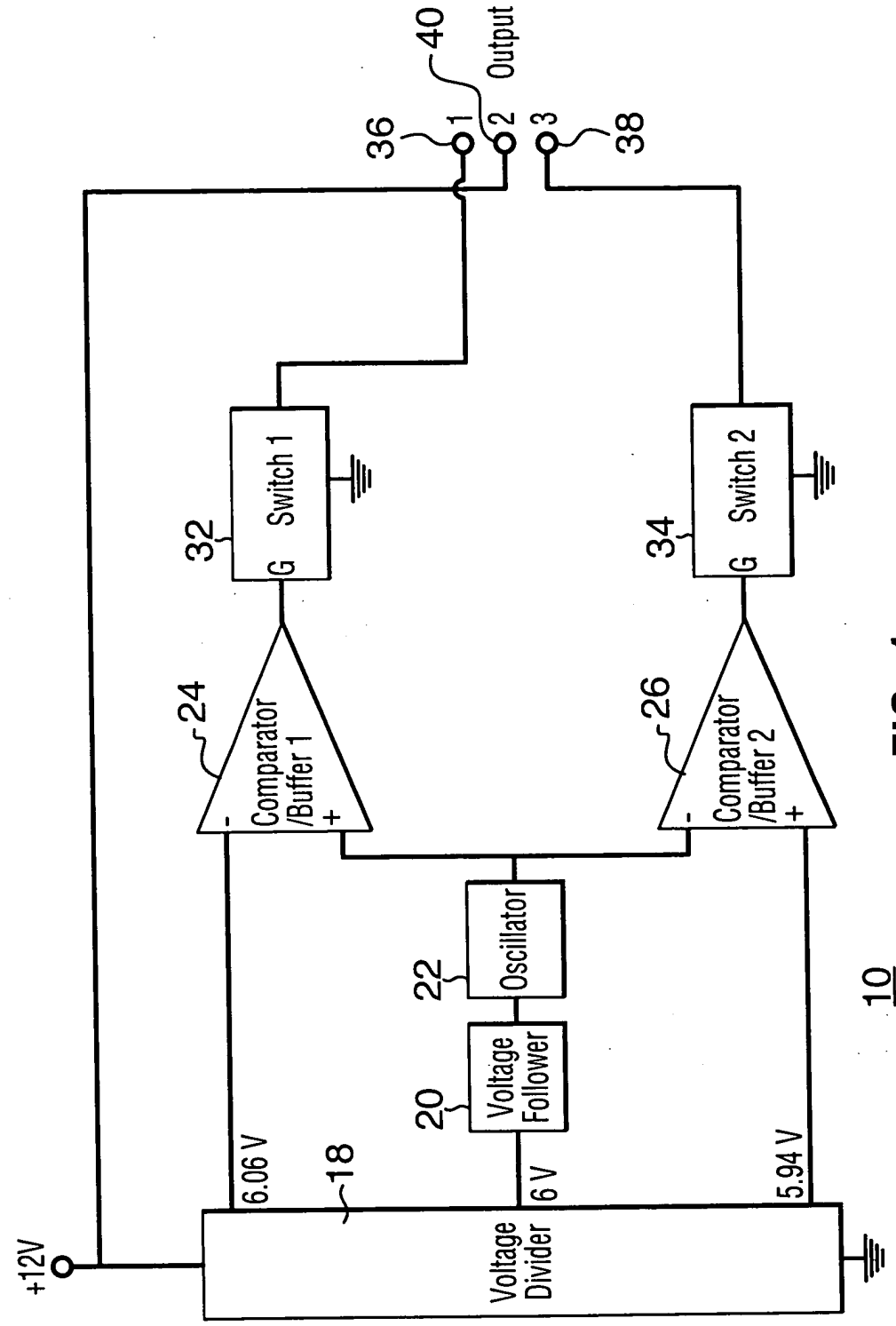
40
Output
36
1
2
3
38
Switch 1
32
G
Switch 2
34
G
24
Comparator
/Buffer 1
-
+
26
Comparator
/Buffer 2
-
+
Oscillator
22
Voltage
Follower
20
6.06 V
18
6 V
5.94 V
+12V
Voltage
Divider
10

FIG. 1

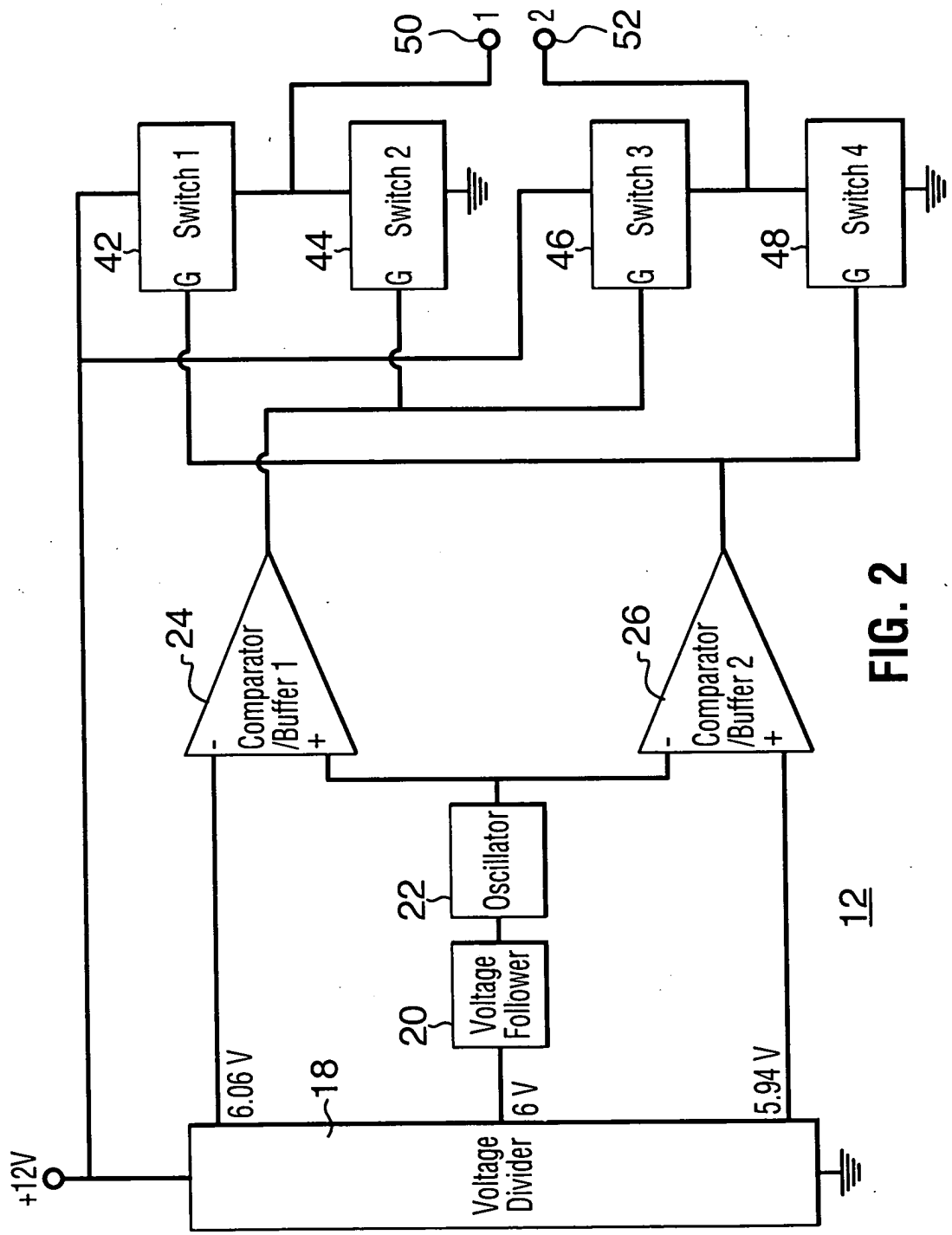
+12V
Voltage Divider
18
6.06 V
6 V
5.94 V
20
Voltage Follower
22
Oscillator
24
Comparator /Buffer 1
26
Comparator /Buffer 2
42
Switch 1
44
Switch 2
46
Switch 3
48
Switch 4
50
1
2
52
12

FIG. 2

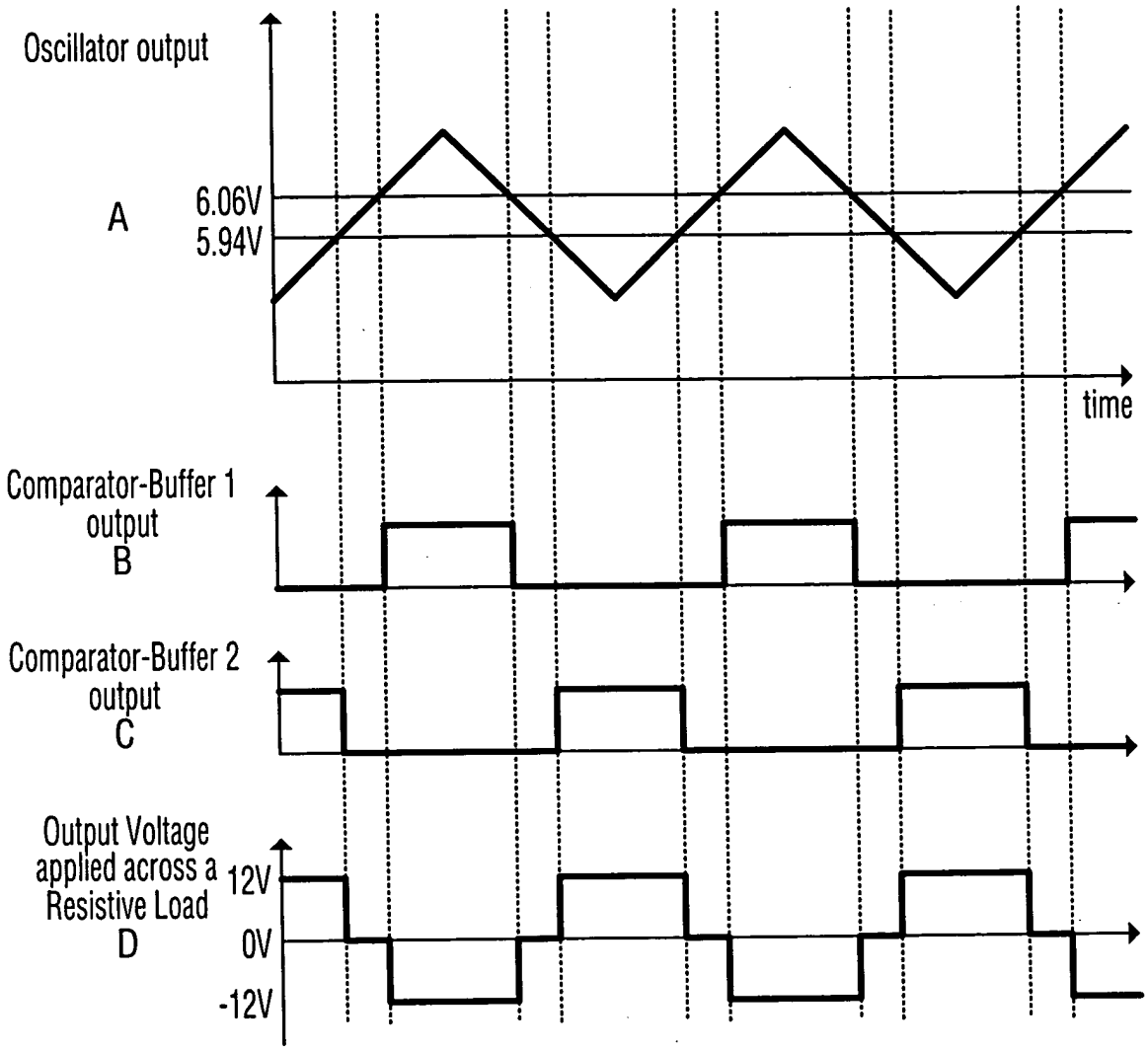
Oscillator output
A
6.06V
5.94V
time
Comparator-Buffer 1 output B
Comparator-Buffer 2 output C
Output Voltage applied across a Resistive Load D
12V
0V
-12V

FIG. 3

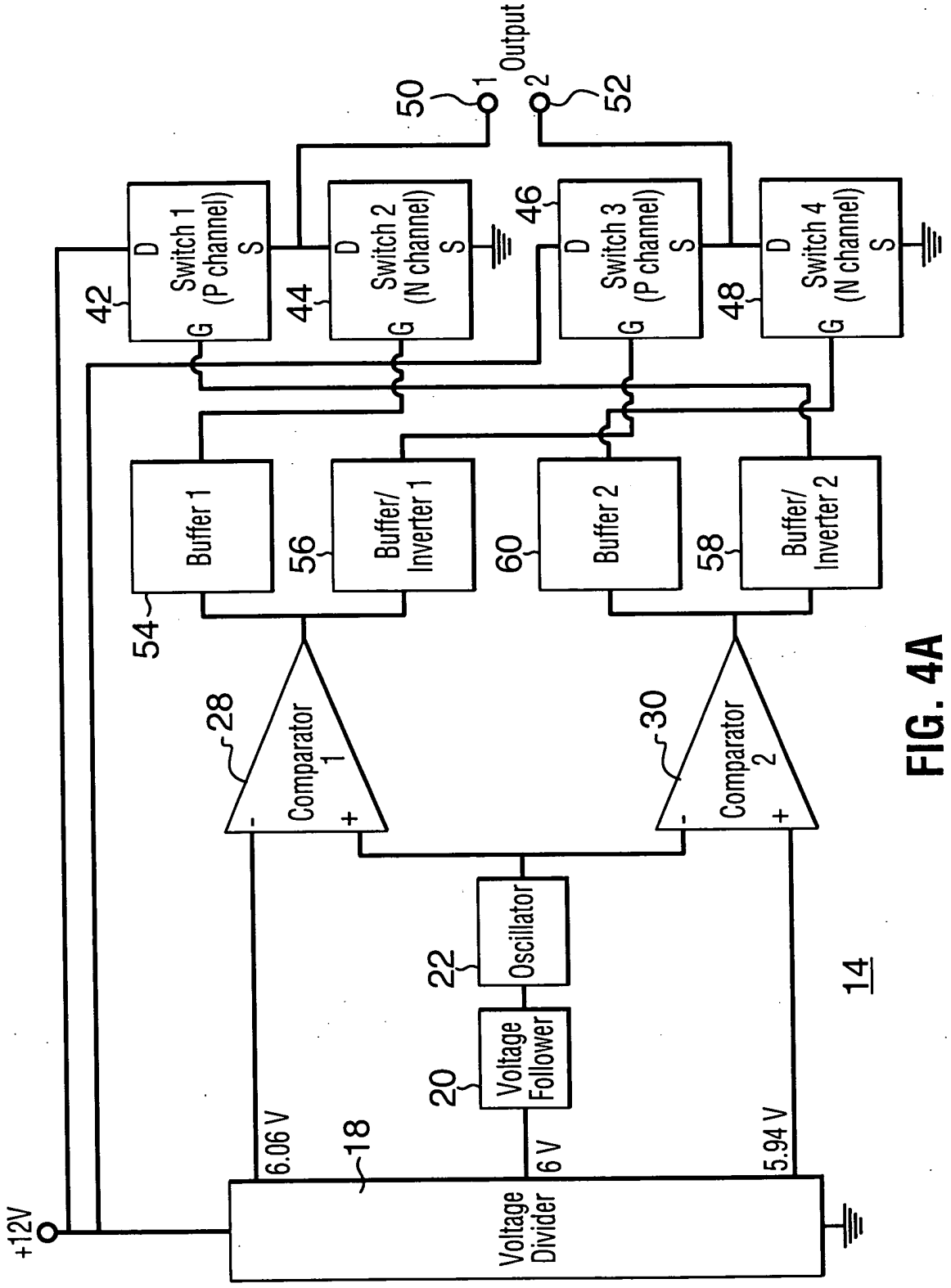
+12V
Voltage Divider
18
6.06 V
6 V
5.94 V
20
Voltage Follower
22
Oscillator
14
28
Comparator 1
30
Comparator 2
54
Buffer 1
56
Buffer/ Inverter 1
60
Buffer 2
58
Buffer/ Inverter 2
42
Switch 1 (P channel)
44
Switch 2 (N channel)
46
Switch 3 (P channel)
48
Switch 4 (N channel)
D
S
G
50
52
Output
1
2

FIG. 4A

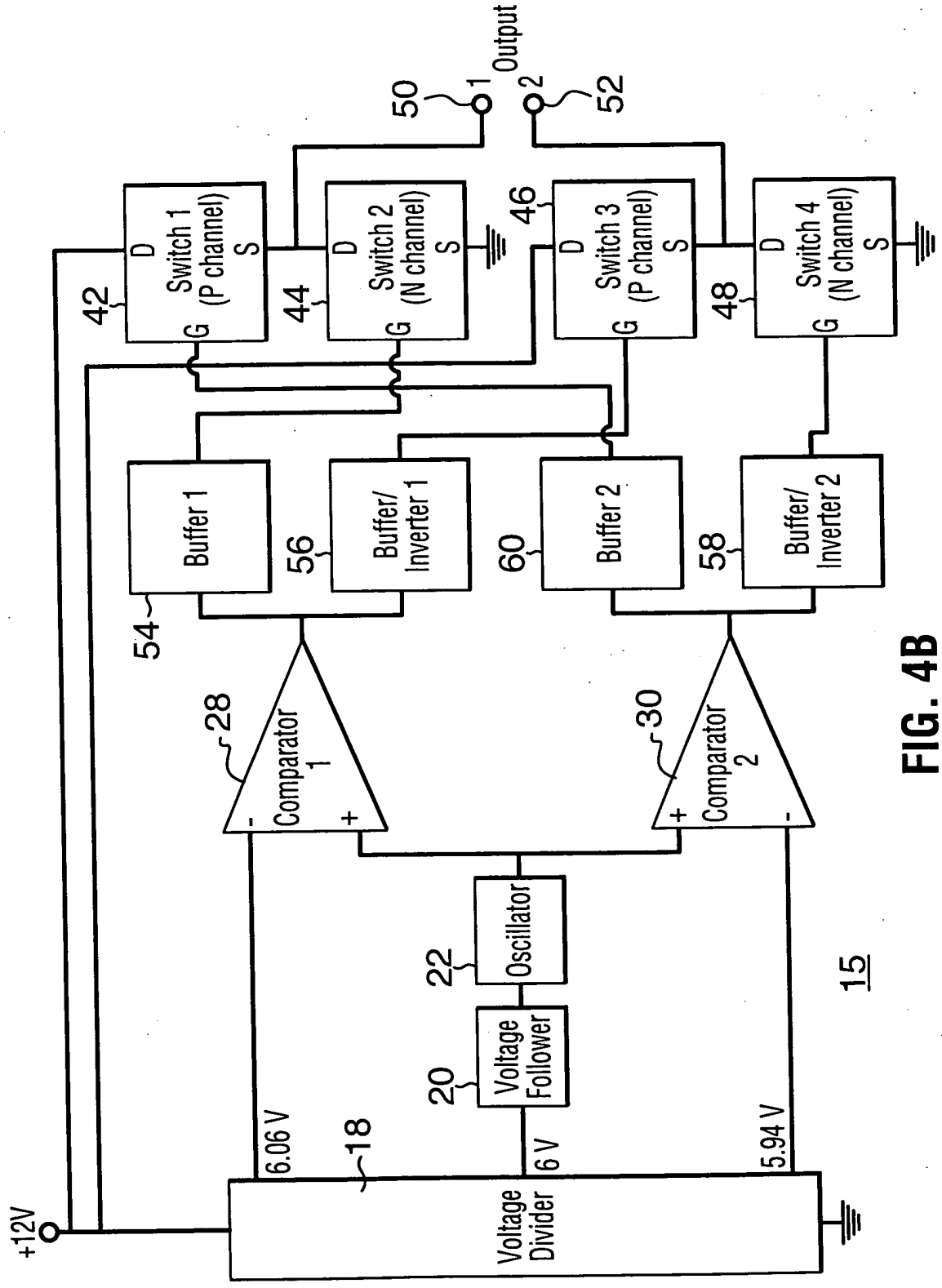
+12V
Voltage Divider
18
6.06 V
6 V
5.94 V
Voltage Follower
20
Oscillator
22
15
Comparator 1
28
Comparator 2
30
Buffer 1
54
Buffer/ Inverter 1
56
Buffer 2
60
Buffer/ Inverter 2
58
Switch 1 (P channel)
42
Switch 2 (N channel)
44
Switch 3 (P channel)
46
Switch 4 (N channel)
48
D
S
G
Output
1
2
50
52

FIG. 4B

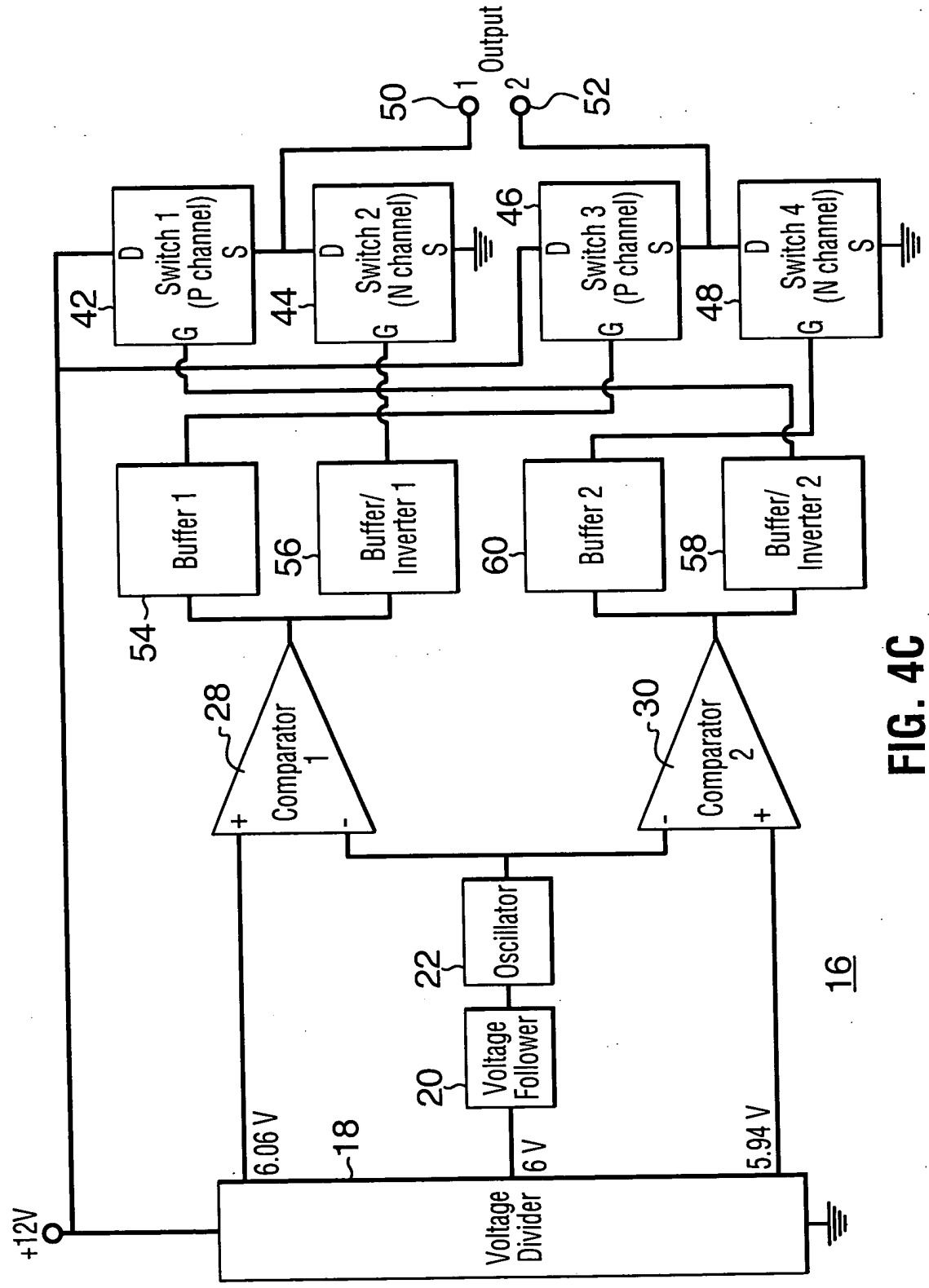
+12V
Voltage Divider
18
6.06 V
6 V
5.94 V
16
Voltage Follower
20
Oscillator
22
Comparator 1
28
Comparator 2
30
Buffer 1
54
Buffer/ Inverter 1
56
Buffer 2
60
Buffer/ Inverter 2
58
Switch 1 (P channel)
42
Switch 2 (N channel)
44
Switch 3 (P channel)
46
Switch 4 (N channel)
48
Output
50
52
D
S
G

FIG. 4C

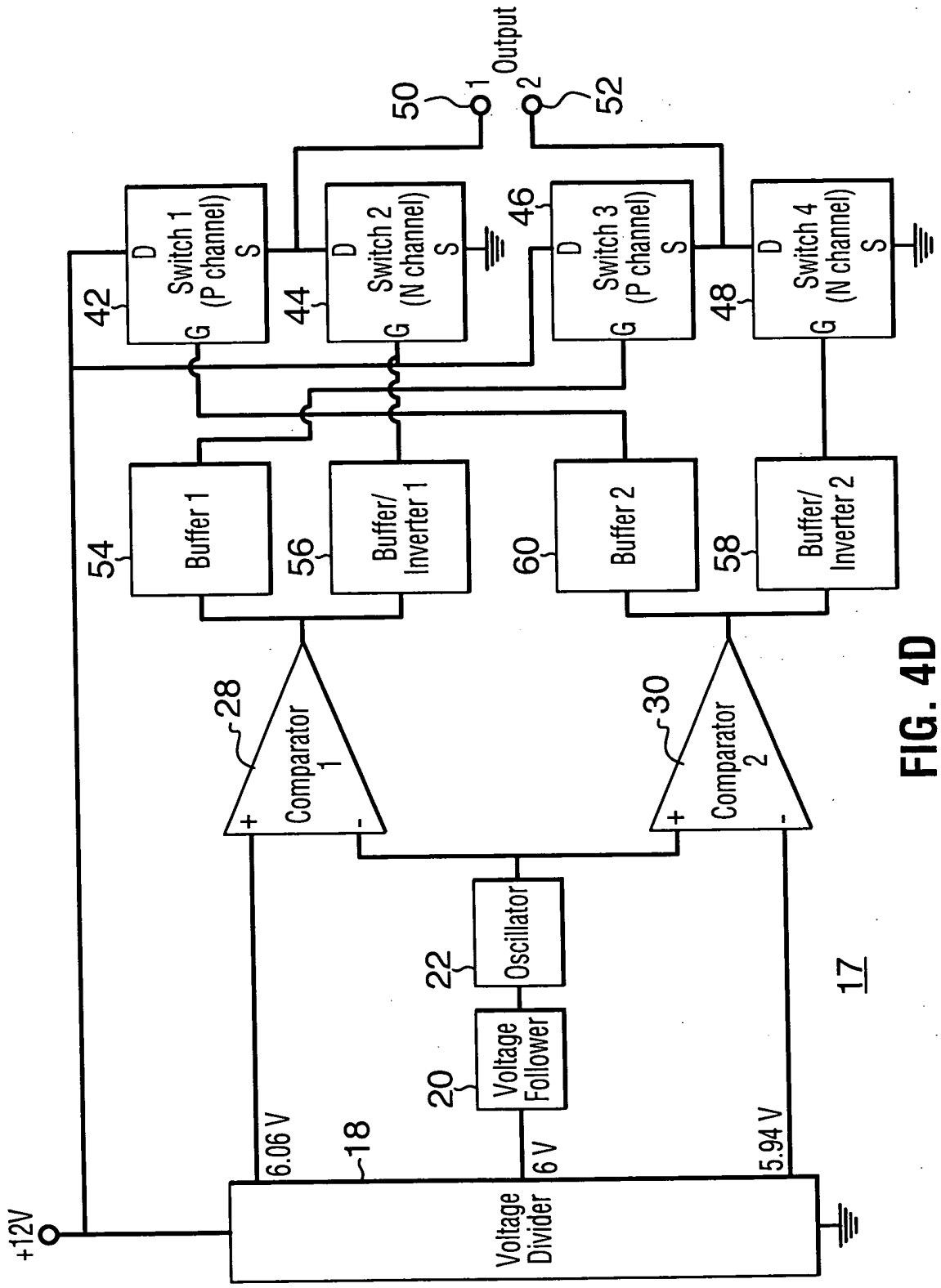
+12V
Voltage Divider
18
6.06 V
6 V
5.94 V
17
20
Voltage Follower
22
Oscillator
28
Comparator 1
30
Comparator 2
54
Buffer 1
56
Buffer/ Inverter 1
60
Buffer 2
58
Buffer/ Inverter 2
42
Switch 1 (P channel)
44
Switch 2 (N channel)
46
Switch 3 (P channel)
48
Switch 4 (N channel)
D
S
G
50
1
Output
2
52

FIG. 4D

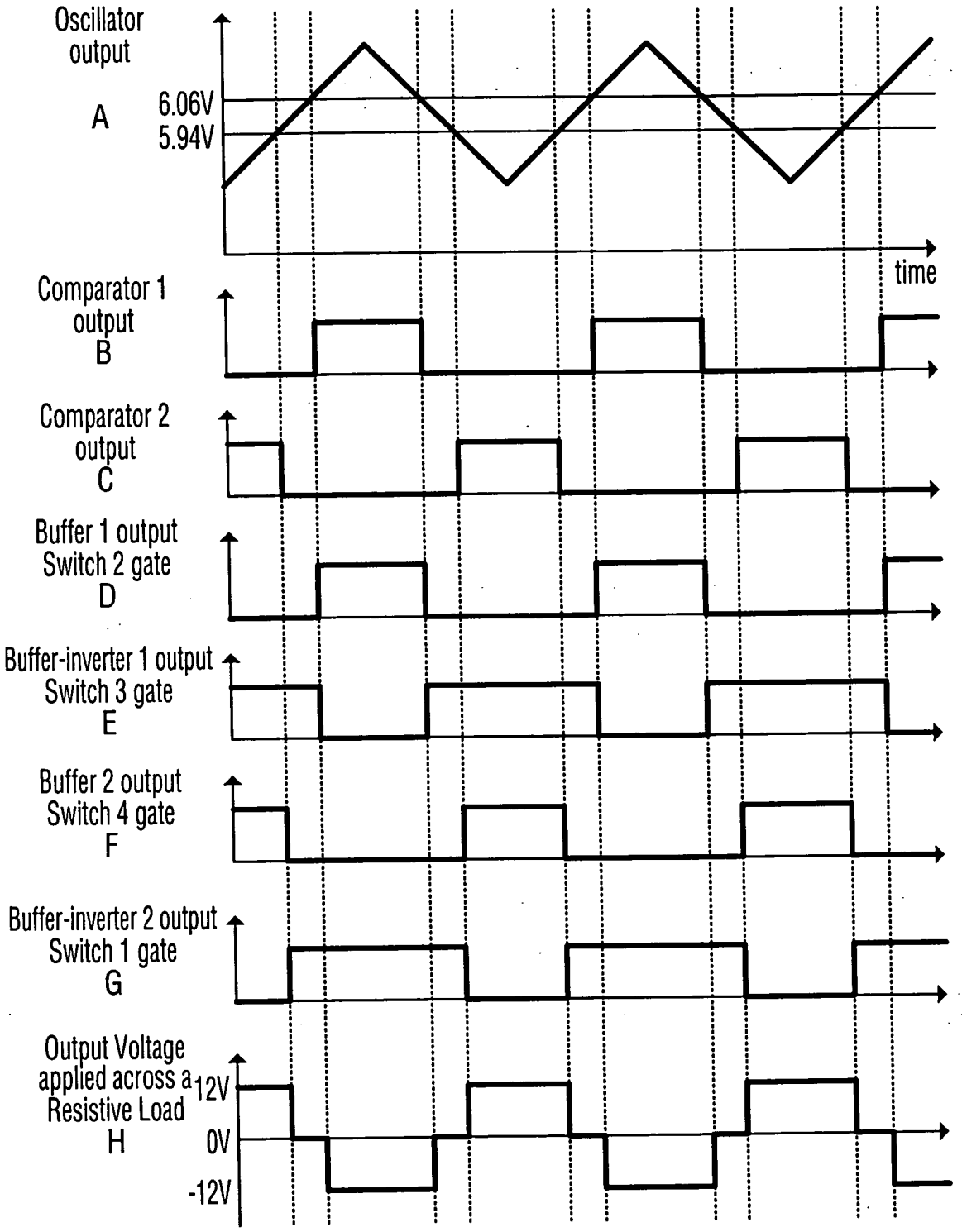
Oscillator output
A
6.06V
5.94V
time
Comparator 1 output
B
Comparator 2 output
C
Buffer 1 output
Switch 2 gate
D
Buffer-inverter 1 output
Switch 3 gate
E
Buffer 2 output
Switch 4 gate
F
Buffer-inverter 2 output
Switch 1 gate
G
Output Voltage applied across a Resistive Load
H
12V
0V
-12V

FIG. 5

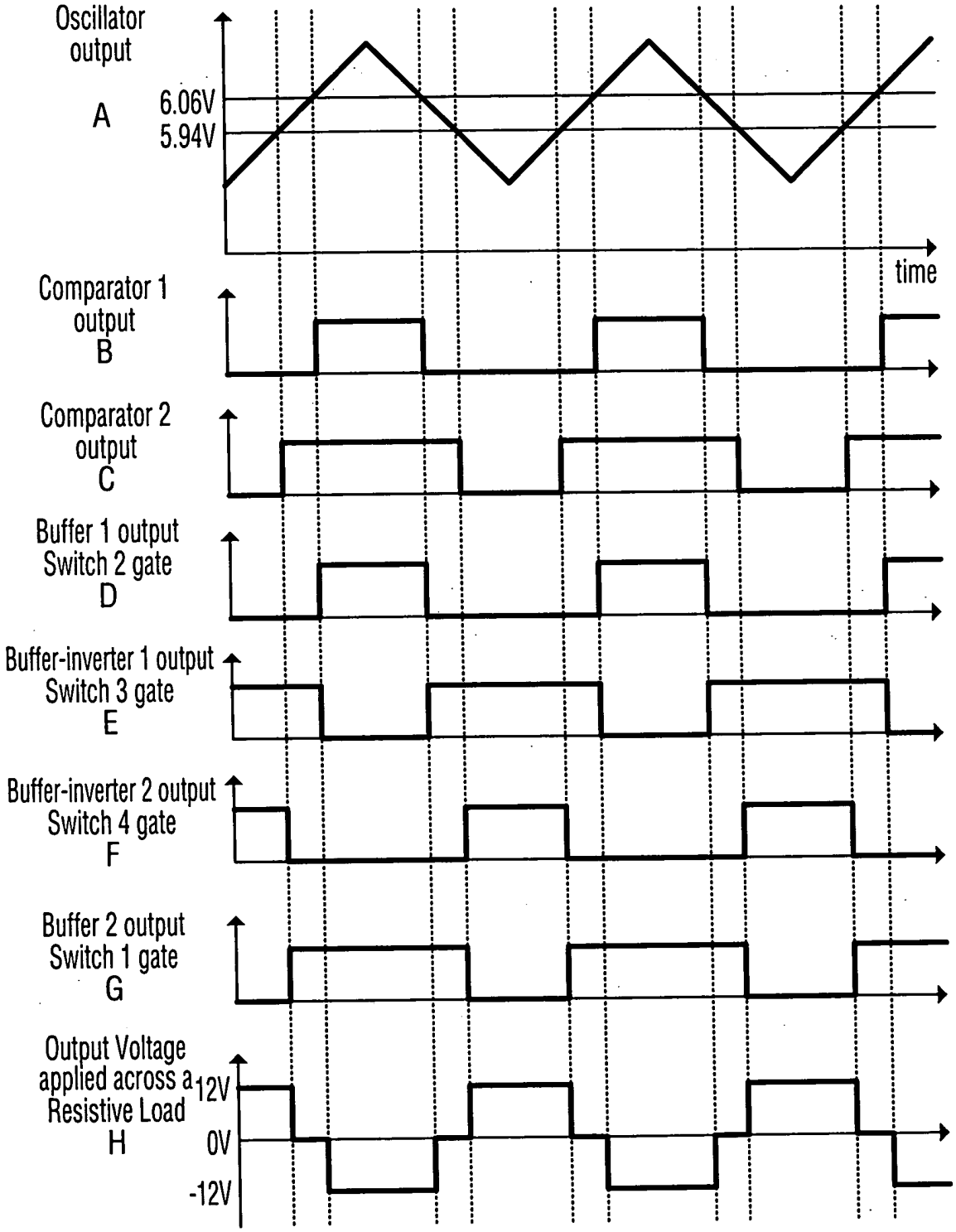
Oscillator output
A
6.06V
5.94V
time
Comparator 1 output
B
Comparator 2 output
C
Buffer 1 output
Switch 2 gate
D
Buffer-inverter 1 output
Switch 3 gate
E
Buffer-inverter 2 output
Switch 4 gate
F
Buffer 2 output
Switch 1 gate
G
Output Voltage applied across a Resistive Load
H
12V
0V
-12V

FIG. 6

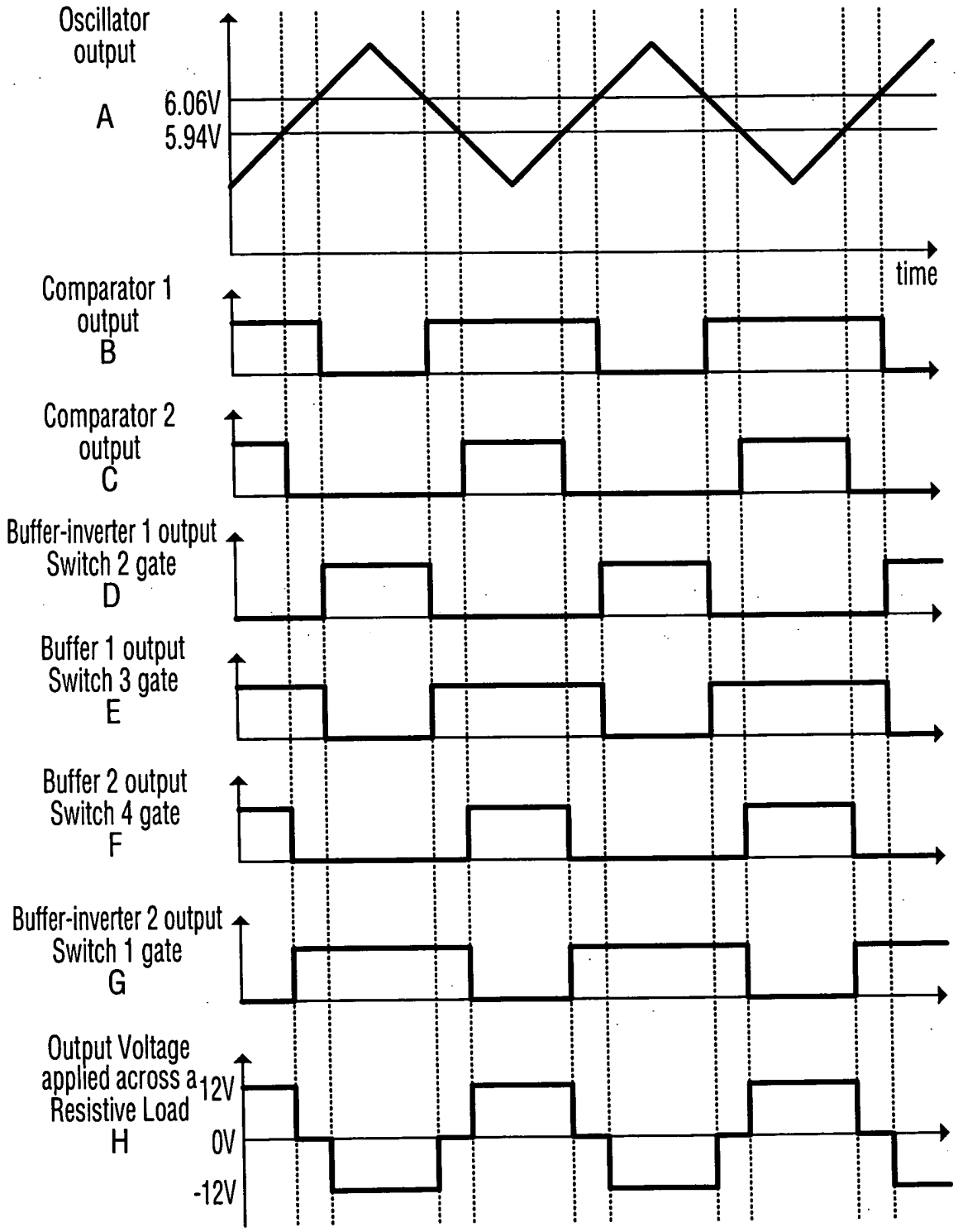
Oscillator output
A
6.06V
5.94V
time
Comparator 1 output
B
Comparator 2 output
C
Buffer-inverter 1 output
Switch 2 gate
D
Buffer 1 output
Switch 3 gate
E
Buffer 2 output
Switch 4 gate
F
Buffer-inverter 2 output
Switch 1 gate
G
Output Voltage applied across a Resistive Load
H
12V
0V
-12V

FIG. 7

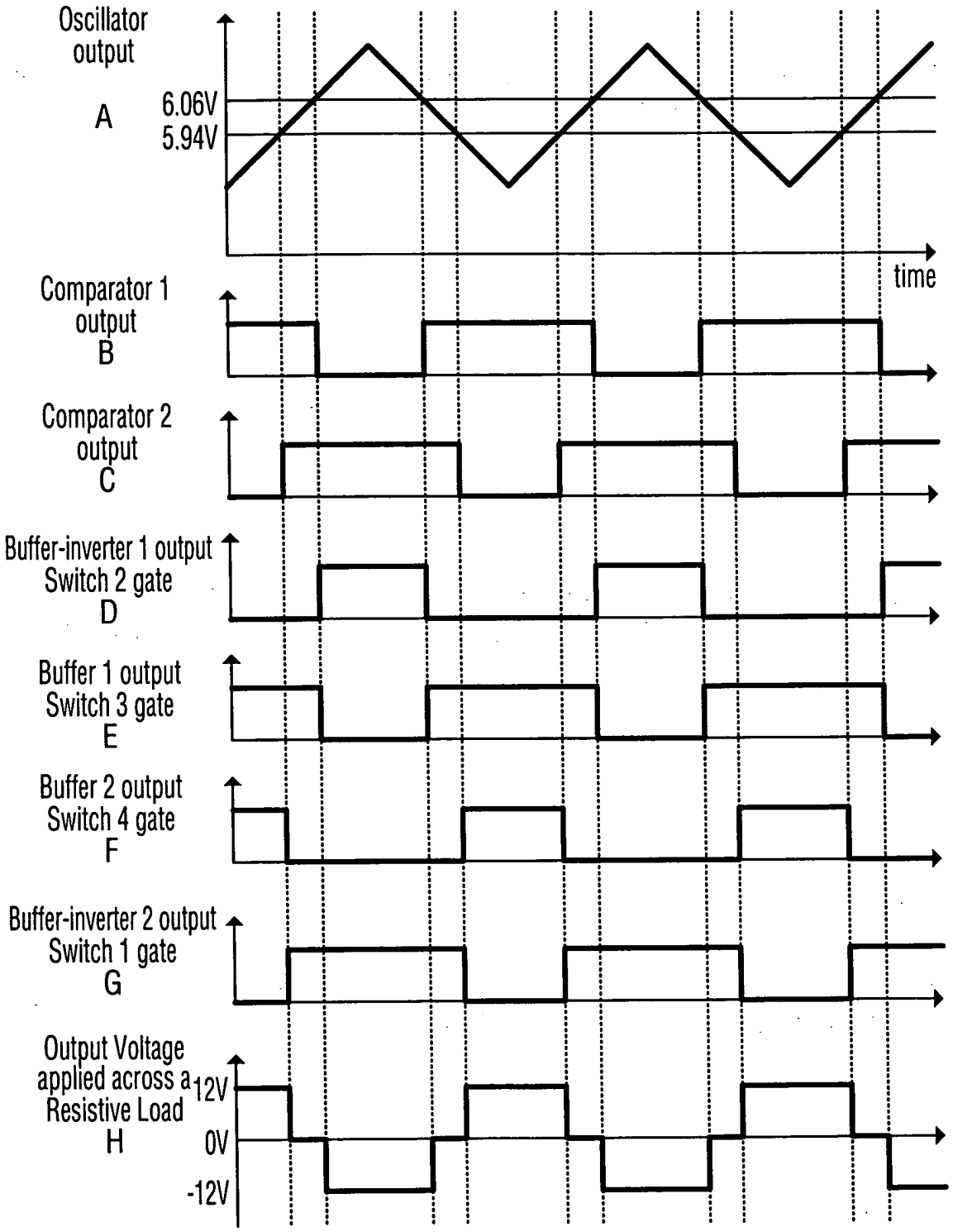
Oscillator output
A
6.06V
5.94V
time
Comparator 1 output
B
Comparator 2 output
C
Buffer-inverter 1 output
Switch 2 gate
D
Buffer 1 output
Switch 3 gate
E
Buffer 2 output
Switch 4 gate
F
Buffer-inverter 2 output
Switch 1 gate
G
Output Voltage applied across a Resistive Load
H
12V
0V
-12V

FIG. 8

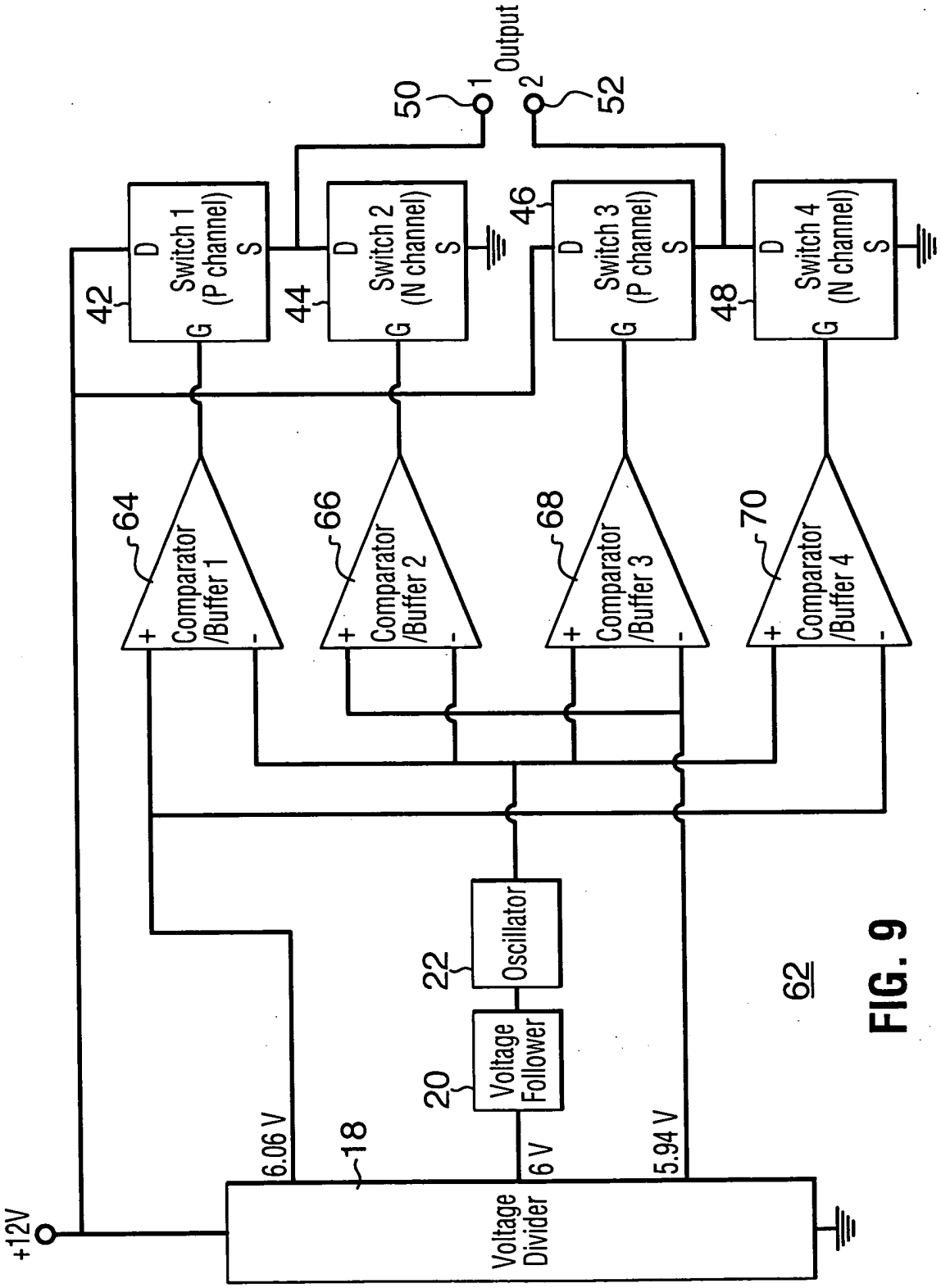
+12V
Voltage Divider
18
6.06 V
6 V
5.94 V
20
Voltage Follower
22
Oscillator
62
64
Comparator /Buffer 1
66
Comparator /Buffer 2
68
Comparator /Buffer 3
70
Comparator /Buffer 4
42
Switch 1 (P channel)
44
Switch 2 (N channel)
46
Switch 3 (P channel)
48
Switch 4 (N channel)
D
S
G
50
52
Output
1
2

FIG. 9

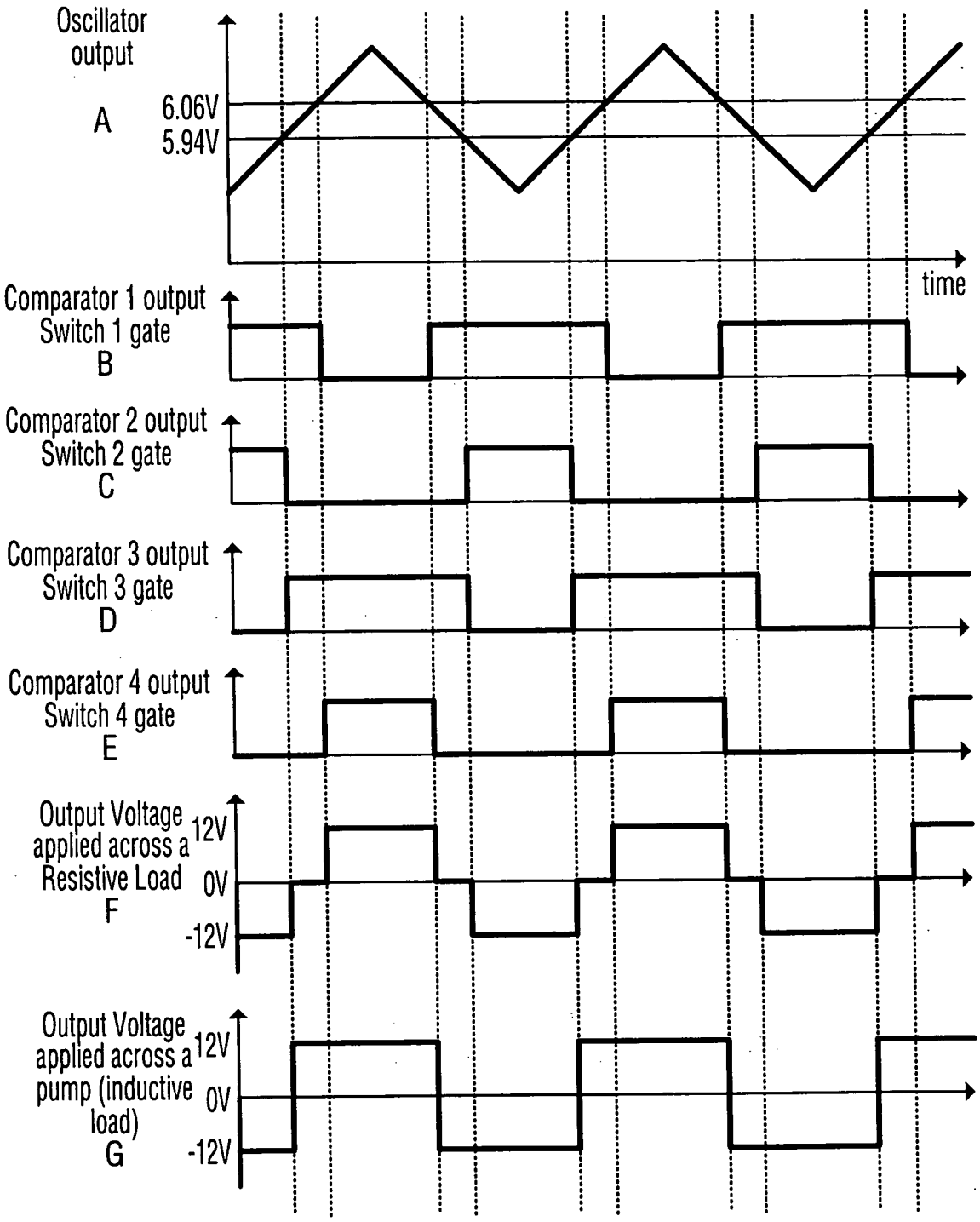
Oscillator output
A
6.06V
5.94V
time
Comparator 1 output
Switch 1 gate
B
Comparator 2 output
Switch 2 gate
C
Comparator 3 output
Switch 3 gate
D
Comparator 4 output
Switch 4 gate
E
Output Voltage applied across a Resistive Load
F
12V
0V
-12V
Output Voltage applied across a pump (inductive load)
G
12V
0V
-12V

FIG. 10

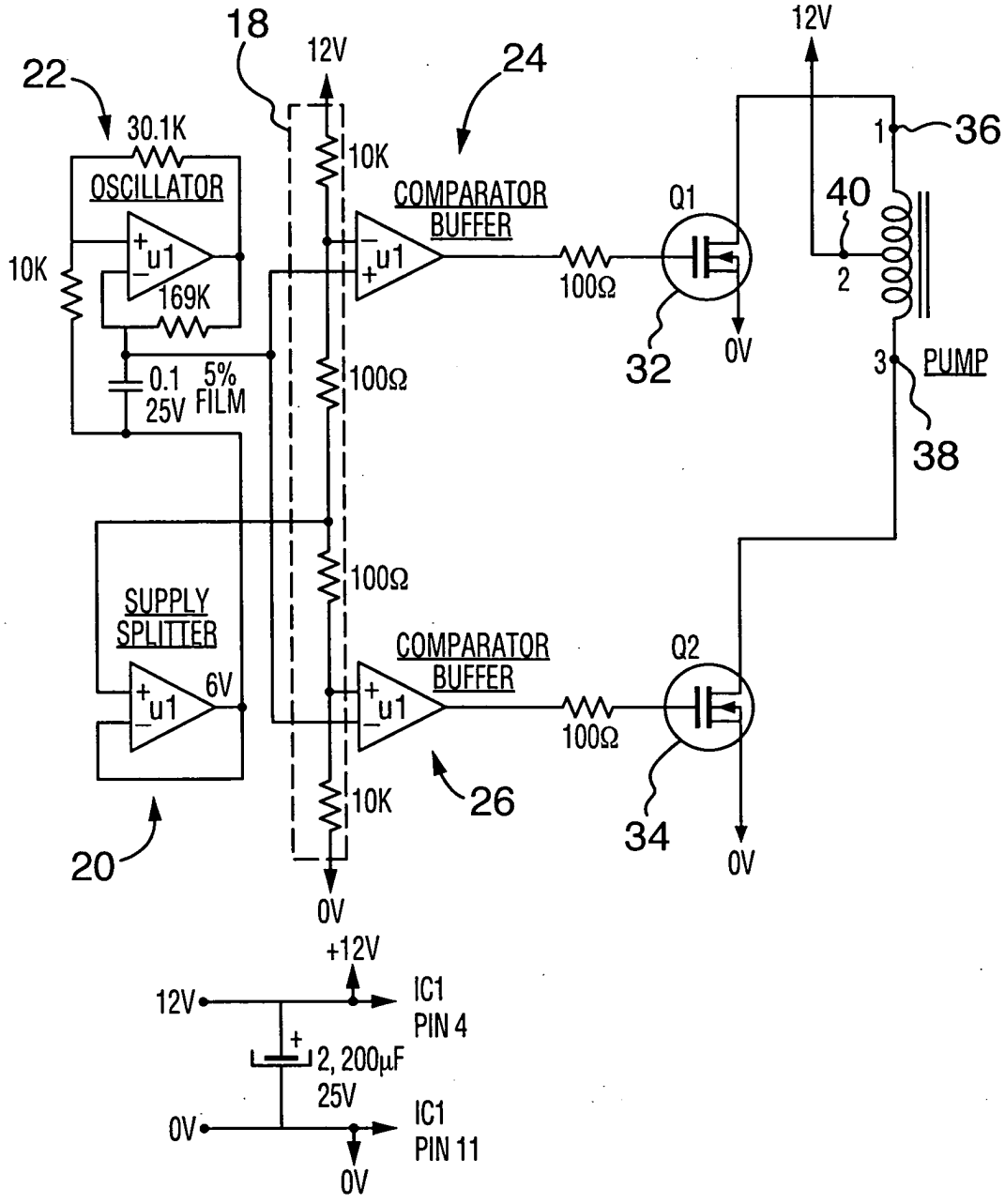
18
12V
22
24
30.1K
OSCILLATOR
10K
u1
169K
0.1 5%
25V FILM
10K
COMPARATOR
BUFFER
u1
100Ω
Q1
12V
1
36
40
2
32
0V
3
PUMP
38
100Ω
SUPPLY
SPLITTER
6V
u1
100Ω
COMPARATOR
BUFFER
Q2
u1
100Ω
10K
26
34
0V
20
0V
+12V
12V
IC1
PIN 4
2, 200µF
25V
0V
IC1
PIN 11
0V

FIG. 11

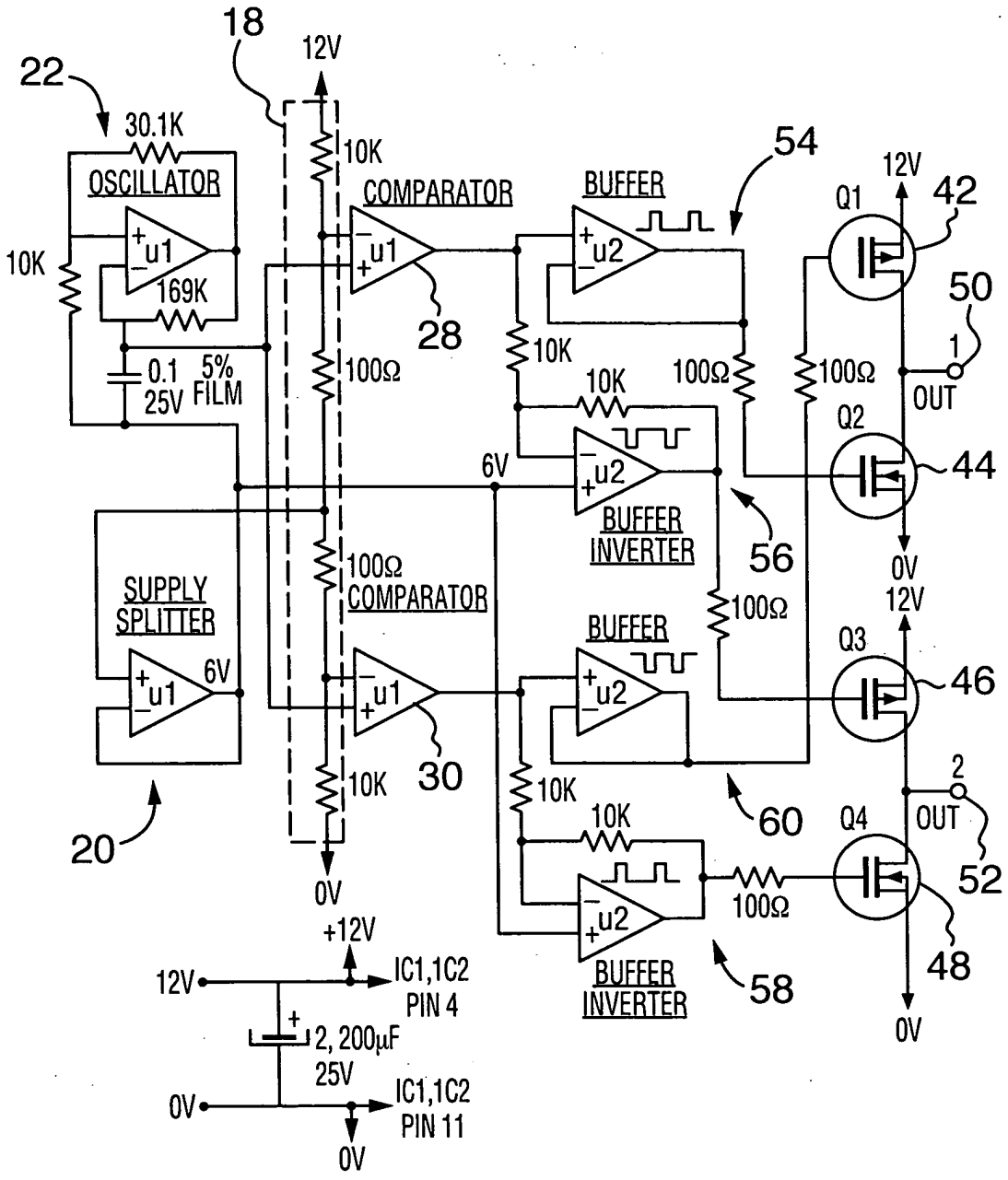
18
12V
22
30.1K
OSCILLATOR
10K
u1
169K
0.1 5%
25V FILM
10K
COMPARATOR
u1
28
100Ω
SUPPLY
SPLITTER
6V
u1
100Ω
COMPARATOR
u1
30
10K
0V
20
+12V
12V
IC1,1C2
PIN 4
2, 200µF
25V
0V
IC1,1C2
PIN 11
0V
54
BUFFER
u2
10K
10K
100Ω
6V
u2
BUFFER
INVERTER
56
BUFFER
u2
10K
10K
100Ω
u2
BUFFER
INVERTER
58
60
Q1
12V
42
50
100Ω
1
OUT
Q2
44
0V
100Ω
Q3
12V
46
2
Q4
OUT
52
100Ω
48
0V

FIG. 12

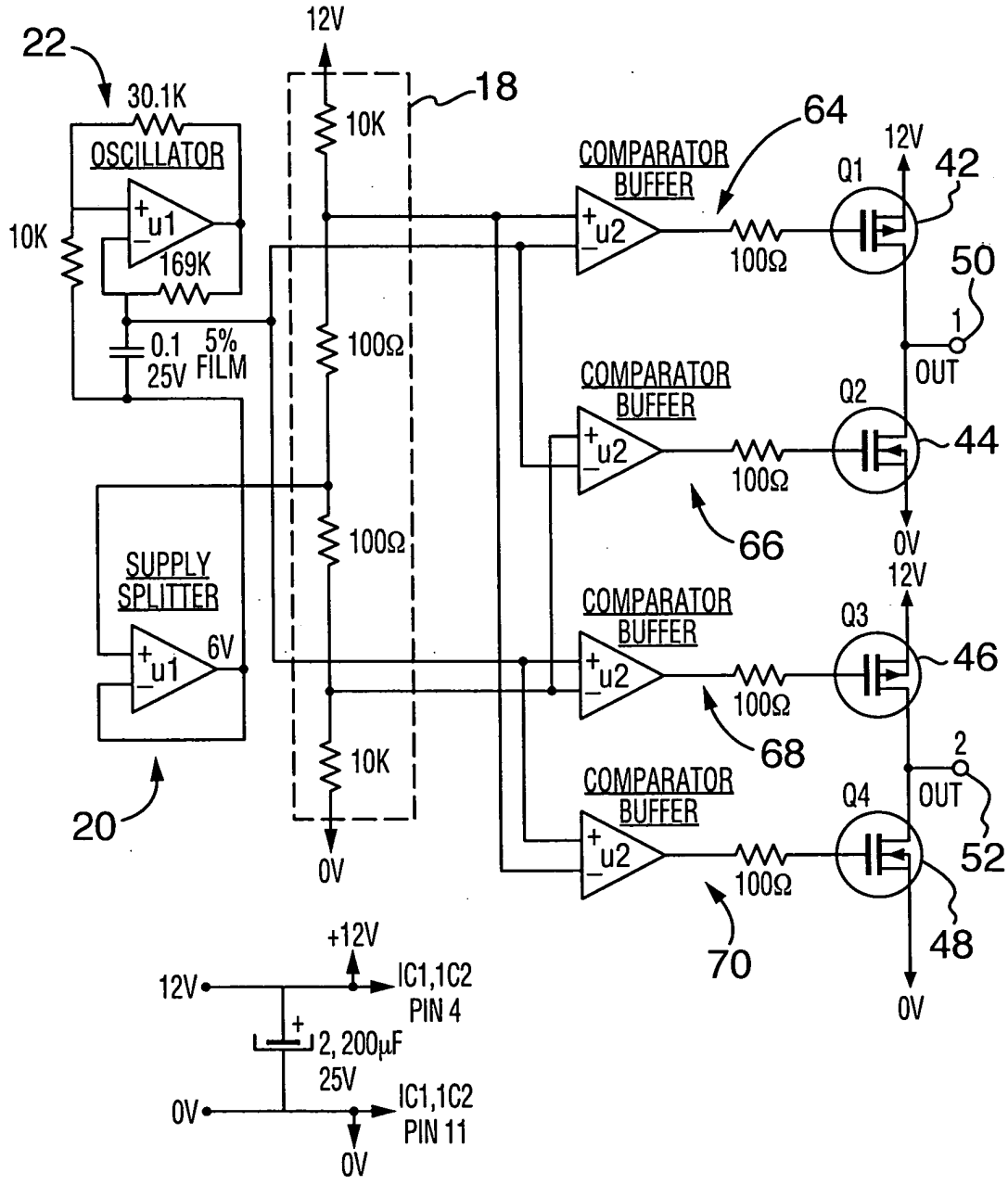
22
30.1K
OSCILLATOR
10K
+u1
−
169K
0.1 25V 5% FILM
SUPPLY SPLITTER
6V
20
12V
18
10K
100Ω
100Ω
10K
0V
64
COMPARATOR BUFFER
+u2
−
100Ω
Q1
12V
42
50
1
OUT
COMPARATOR BUFFER
Q2
44
66
0V
COMPARATOR BUFFER
12V
Q3
46
68
2
OUT
COMPARATOR BUFFER
Q4
52
48
70
0V
+12V
12V
IC1,1C2 PIN 4
2, 200µF 25V
0V
IC1,1C2 PIN 11
0V

FIG. 13